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Unintended consequences of the ‘bushmeat ban’ in West Africa during the 2013–2016 Ebola virus disease epidemic

Jesse Bonwitt^{a,*}, Michael Dawson^b, Martin Kandeh^c, Rashid Ansumana^b, Foday Sahr^d, Hannah Brown^a, Ann H. Kelly^e

^a Department of Anthropology, Durham University, Dawson Building, South Road, Durham, DH1 3LE, UK

^b Mercy Hospital Research Laboratory, Bo, Sierra Leone

^c Department of Social Sciences, Njala University, Bo, Sierra Leone

^d Department of Microbiology, College of Medicine and Allied Health Sciences, University of Sierra Leone, Freetown, Sierra Leone

^e Department of Global Health & Social Medicine, School of Global Affairs, Faculty of Social Science and Public Policy, King's College London, UK

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ABSTRACT

Following the 2013–2016 outbreak of Ebola virus disease (EVD) in West Africa, governments across the region imposed a ban on the hunting and consumption of meat from wild animals. This injunction was accompanied by public health messages emphasising the infectious potential of wild meat, or ‘bushmeat.’ Using qualitative methods, we examine the local reception and impact of these interventions. Fieldwork was focused in 9 villages in the Eastern and Southern provinces of Sierra Leone between August and December 2015. We conducted 47 semi-structured interviews, coordinated 12 informal group discussions, and conducted direct observations throughout. We also draw from research undertaken in Sierra Leone immediately before the outbreak, and from our participation in the EVD response in Guinea and Sierra Leone. Our findings underscore the social and political reverberations of hunting proscriptions. Messaging that unilaterally stressed the health risk posed by wild meat contradicted the experiences of target publics, who consume wild meat without incident. This epistemic dissonance radically undercut the effectiveness of the ban, which merely served to proliferate informal networks of wild animal trade and sale—rendering the development of acceptable, evidence-based surveillance and mitigation strategies for zoonotic spillovers almost impossible. Further, the criminalisation of wild meat consumption fuelled fears and rumours within communities under considerable strain from the health, social, and economic effects of the epidemic, entrenching distrust towards outbreak responders and exacerbating pre-existing tensions within villages. These unintended consequences are instructive for public health emergency response and preparedness. While wild meat is a risk for zoonotic infection, mitigating those risks entails interventions that fully take into account the local significances of hunting—including a communicative engagement that is designed, validated, and continually refined before emergency situations. Ultimately, our research questions the value of legal sanctions as a means of behavioural change in an emergency context.

1. Introduction

The first cases of the 2013–2016 West African Ebola virus disease (EVD) outbreak were reported in a forested region of Guinea. Although the zoonotic spillover event that triggered the outbreak remains elusive, retrospective investigations traced the index case back to a village in Guinea where residents had come into contact with bats (Marí Sáez et al., 2015). After almost two years of sustained transmission, the outbreak ultimately totalled more than 28,600 cases with over 11,300 deaths (WHO, 2016a), the majority occurring in Guinea, Liberia, and Sierra Leone. The outbreak is the first known EVD outbreak to occur in

West Africa, besides from an isolated case in Ivory Coast (WHO Ebola Response Team, 2016).

Handling and butchering infected animals including bats, duiker antelopes, and nonhuman primates have been found to play a role in previous EVD outbreaks (Olivero et al., 2017). The proscription of hunting and consumption of certain species of wild animals, in particular fruit bats and nonhuman primates, has therefore formed a primary component of EVD prevention campaigns (WHO, 2016b). In line with these policies, one of the first public health measures implemented to control the West African outbreak was to ban hunting, sale, and consumption of wild animals. These measures were introduced despite

* Corresponding author.

E-mail address: jesse.bonwitt@durham.ac.uk (J. Bonwitt).

early evidence that the outbreak was driven by human-to-human transmission, rather than repeated contact with wild animals or their meat (Baize et al., 2014; Gire et al., 2014), which was deemed a minimal risk (FAO, 2015). Indeed, this conforms to what is known about EVD outbreaks: once ebolaviruses are introduced into a human population through a zoonotic spillover, epidemics are driven principally by human-to-human transmission.

This article presents research undertaken to explore the local impact of the wild meat ban, and in particular, how affected communities in Sierra Leone made sense of wild meat prohibition and the public health messages that ushered in its implementation. The messages related to the risks posed by wild meat were largely diffused by national and international governmental, intergovernmental, and nongovernmental organizations, and presented as a strategy to control the outbreak. The ban on wild meat undermined the importance and legitimacy of health messages; first by overemphasising the risks of consuming wild meat at the cost of more relevant messages (e.g., avoiding contact with sick and deceased people) (Richards, 2016), and second, by contradicting individuals' everyday experiences (Richards, 2016; Seytre, 2016). A key insight is the epistemic dissonance between the public health framing of wild meat as hazardous and the practical and social significance of the activities that occasion contact with that hazard. Proscriptive measures on the sale and consumption of wild meat not only contributed to local food insecurity, but also amplified community distrust of EVD control efforts, and strained social relations.

The ban was enforced at sanitary and police roadblocks, and wild meat, commonly referred to as 'bushmeat,' was seized and destroyed (BBC, 2015; Guineematin.com, 2014, 2016). Although we did not find official documentation on legal penalties, informants cited a fine of up to Le 500,000 (≈US\$125) and one to three months' imprisonment. While these measures received some criticism from the public health community for diverting attention and resources from more relevant efforts at preventing human-to-human transmission (Faye, 2015; Seytre, 2016; Wilkinson and Leach, 2014), the 'bushmeat' ban was enforced during the entire outbreak. Arguably, the policy traction 'bushmeat' received as the primary culprit for the epidemic and thus, the privileged target for control, relates to the powerful place 'backward practices' play in the prototypical 'outbreak narrative' (Sinha and Parmet, 2016; Wald, 2008). Yet for rural populations in sub-Saharan Africa, wild meat provides an important source of food (Nasi and Fa, 2015) and ready cash (Schulte-Herbruggen et al., 2013). Products derived from wild animals are also valued for medicinal and ritual purposes, as symbols of status, or simply for taste, habit, and availability (Nasi et al., 2008).

'Bushmeat' has long been a sensitive issue in the relations between communities, governments, and international organizations in sub-Saharan Africa. Historically, hunting bans have been driven by wildlife conservation (Duffy, 2014), providing an important legal instrument to protect endangered species. However, to accommodate nutrition and livelihood needs, bans have subsequently been reframed, encouraging sustainable hunting practices rather than outlawing consumption entirely (IIED, 2000). Debates about the term 'bushmeat' itself suggest forms of social distancing with the hunting and consumption of wild animals. Indeed, while 'bushmeat' is the popular term, the ambiguity and derogatory connotations associated with it (McGovern, 2017) have led for calls to replace it with the term 'wild meat' or 'meat from wild animals' (OIE, 2014).

The threat emerging infectious diseases pose to global health (Wolfe et al., 2005) has challenged that fragile policy balance between local practices and global priorities. The West African EVD outbreak has further polarised the debate over the significance of bans as a public health measure (Nasi and Fa, 2014; Pooley et al., 2015) and refocused attention on the neo-colonialist roots of top-down land and resource management (Yamakoshi and Leblan, 2013).

Resistance to public health interventions—a reaction not uncommon to previous EVD outbreak responses (Anoko, 2014; Hewlett

and Hewlett, 2008)—clearly underscores the critical importance of recognizing local experiences and working with local partners when responding to an epidemic (Abramowitz et al., 2015; Hewlett and Amola, 2003). Equally important is what the strategic circumstances and redeployments of compulsory measures can teach us about building more resilient, relevant, and equitable approaches to global health security (Heymann et al., 2015).

2. Methods and approach

This paper primarily draws upon four months of fieldwork in the Southern Province (Bo, Pujehun, and Moyamba districts) and Eastern Province (Kenema district) of Sierra Leone. The first EVD cases in Sierra Leone were reported in late May 2014. Fieldwork was conducted intermittently by JB, MD, and MK between August and December 2015. We also draw on interviews and observations collected by JB and MD in May and June 2014 during research on zoonotic risks of animal–human interactions from the same study sites. Initially, we worked in three villages chosen based on familiarity with the research team from previous work around Lassa fever, ongoing over the previous two years. Six additional villages, identified through snowball sampling, were chosen to represent more isolated areas up to 50 km from major towns.

Semi-structured interviews were conducted in English, Mende (the language of the largest ethnic group in the Southern Province), or Krio (creole English), and lasted between 30 and 90 min. Interview guides enquired about the participant's understanding and interpretation of public health messages related to EVD and wild animals, and how these understandings affected hunting, consumption, and trade of wild meat. Although the questions were predetermined, they were posed in an informal manner to encourage discussion. Direct observations and informal discussions were conducted throughout the study. Informants included village chiefs, elders, teachers, housewives, swidden ('slash and burn') farmers, small-scale traders, and children (from the age of 7). Results from observation guides for direct and participatory observations with trusted informants were used for our research on animal–human interactions as part of a larger study on Lassa and Ebola viruses and are also presented here, as some occurred during the hunting ban.

Recordings and field notes were immediately transcribed (ODMS, Olympus Corporation, Tokyo, Japan) into English by the field researchers using MS Word 2011 (Redmond, WA, USA). Recordings were stored on a password-protected hard drive. Transcripts were rendered anonymous from the onset and shared online with the research team, along with a summary of main points, themes, and suggestions for follow up questions. Data interpretation was undertaken in an iterative fashion, providing comparative insight into the key themes and arising issues. Multiple methods of data collection (i.e., observations and discussions from different sources) also provided a means of triangulating emerging themes until saturation was achieved. Coding was done in MS Word 2011 by color-coding repeated categories (e.g., impacts on livelihoods) and subcategories (e.g., developing alternative livelihood strategies). Repeated themes were identified and discussed with research assistants and the broader team, which then formed the basis of amendments to interview and observation guides [ONLINE FILE]. Analysis was undertaken continuously and collectively until saturation (Charmaz, 2006). We only report repeat themes in the results.

We anticipated that hunting and consuming wild animals would be a highly sensitive topic during the EVD outbreak and would be difficult to investigate, a limitation that we encountered during research on Lassa fever prior to the EVD outbreak and before heightened sensitivities existed in the same study area. Open-ended and flexible qualitative approaches were critical in allowing informants sufficient latitude to talk around sensitive issues. Among Mende people, for instance, we found that using word tricks, riddles, and humour were of critical importance (Ferme, 2001). For example, 'burying an animal in the cassava pot' became a commonly used, humorous euphemism, to tacitly admit

cooking wild animals rather than burying them as advised by public health messages. Given the prevailing context of fear and suspicion triggered by the outbreak, however, there were occasions where we met a degree of reluctance to share information. Most notably, three hunters from one village refused to be interviewed. Interviews with 18 respondents were not recorded because they refused, or indicated that they preferred not to be recorded, in which case we refrained from voice recording to put informants at ease. This reluctance may have been further fed by our commitment to ensure that informants were informed of the legal and biomedical risks of activities related to wild meat, which we felt was our ethical responsibility. Despite the potential limitations of investigating sensitive behaviours (Inhorn, 2004), because many of our informants knew us prior to the start of the outbreak, they did not associate us with the international outbreak response. Making several extended trips to these areas over a period of nearly eighteen months over the course of the EVD outbreak served to allay these fears, evidenced by being allowed to see facets of underground wild meat practices.

We contextualised these insights from our collective involvement in the EVD response in Guinea with the Food and Agricultural Organization of the UN (livelihoods and food security: JB) and the Guinean Ministry of Health (epidemiology: JB), the response effort in Sierra Leone (anthropology: HB; diagnostics, epidemiology, and clinical treatment: RA and FS), and the World Health Organization (anthropology: AHK). Informal discussions with key national and international policy actors and public health professionals brought considerable insight into the rationalities and challenges in coordinating the global response.

The study was approved by the ethics committee of the Government of Sierra Leone and the University of Exeter, U.K. All study participants (or parent for participants aged under 18 years) provided written or oral consent. No incentives were offered for participating in the study. We emphasized that participants did not have to answer questions, could end their participation at any time without consequences, and that their answers would remain anonymous. Informants were given the opportunity to ask questions about the link between wild animals and EVD. Our answers covered risk factors for zoonotic infection and current hunting regulations.

3. Findings

In total, we conducted 47 semi-structured interviews and 12 informal group discussions. Among the respondents of the semi-structured interviews, one informant was interviewed twice (other respondents were informally interviewed multiple times). There were 32 (70%) men and 14 (30%) women. Respondents were predominantly Mende ($n = 41$, 89%), mixed Mende ($n = 4$, 9%), or Kono ($n = 1$, 2%), and either Christian ($n = 22$, 48%), Muslim ($n = 18$, 39%), or of unknown religion ($n = 6$, 13%).

3.1. Interpretation of EVD public health messages

During the first months of the outbreak, we found that EVD-related public health messages in Guinea and Sierra Leone primarily emphasized the risk posed from contact with wild animals, such as hunting or consuming their meat, and eating fruits with evidence of having been eaten by bats (Fig. 1). The content of messages warned against handling any species of wild animals, or varyingly specified bats, nonhuman primates, antelopes, swine (domestic and wild), and rodents (Fig. 2). We did not find any warning against contact with wild animals found sick or dead.

As the outbreak progressed, public health messaging focused on more relevant content (e.g., burial practices); however, the enforcement of hunting bans continued. All study participants, irrespective of age or gender, were aware of wild mammals acting as a source of transmission for Ebola virus. When asked to name species of animals

that could transmit Ebola virus, however, respondents gave a variety of answers, ranging from bats and nonhuman primates to specific species such as brush-tailed porcupines or duiker antelopes. One explanation for this confusion rested in the content of public health messages, which were inconsistent in the species shown to be potentially hazardous. Rural residents adept at identifying wild animal species easily spotted these logical discrepancies.

However, messages that were even more precisely pitched would have been met with scepticism, as people simply refused to believe that wild meat could pose any health risk. Informants argued that wild animals were hunted and eaten for generations without ever having caused, or been associated with, an epidemic in humans. The same argument was commonly heard in rural areas of Guinea. That our informants had seen no evidence of large-scale morbidity or mortality in animal populations strengthened their argument, and the concept of asymptomatic animals with ebolavirus infection was deemed hard to believe. The ban provided an opportunity for one student to test this hypothesis, by conducting his own experiment to demonstrate the seemingly ludicrous nature of public health claims:

They were saying that this Ebola: “don’t eat monkey,” hmmm brother, how can Ebola be [in] monkey? Well it is those things that I really proved. Of course even myself, when I started [the experiment of eating monkey], I prevented my family not to eat it, because it was a research such of, so that in case of anything [happening to me], if I am going to suffer, let me suffer for the benefit of them. But I did it [eat monkey], nothing happened. I did it, I ate it one day, I ate it two days, I ate it the other day again, [and] nothing happened. After the week, the other week I told my family to cook it and let’s eat it. And indeed both the children and the elders, my own family members in my house that I am responsible for, everybody was eating from the same pot (University student IDI-09B).

The widespread suspicion over the risks posed by wild animals prompted discussions during village meetings to discuss the veracity of public health messages. Informants advanced various theories to explain why hunting and consumption of wild animals were banned. For example the government was attempting to consolidate power by weakening villages in areas supporting the opposition party (wild meat is considered an important source of physical ‘strength’ and energy). Some informants wondered whether environmental conservationists introduced the ban to prevent poaching, pointing out that the outbreak was first reported in the east of the country close to a major national park. This proved to be a striking echo of the same rumours reported during the first EVD outbreaks in Central Africa (Hewlett and Hewlett, 2008), and later reported in Togo (Seytre, 2016), as well as what we heard in Guinea.

Other informants formulated their own definition of which species might constitute a risk for EVD based on an assemblage of personal observations, other EVD-related public health messages, and cultural notions of what determines the edibility of an animal. Drawing on the warning of contaminated fruit, people categorized species based on their feeding patterns: species considered frugivores, such as nonhuman primates and duiker antelopes, were no longer eaten, whereas species considered to be strictly herbivorous, such as cane rats, could still be eaten. A community animal healthcare worker elaborated that rationale:

I don’t know because, it [cane rat] don’t depends on some of the fruit, it mainly depends on rice and this savannah grass, so they eat this savannah grass [...]. But through the food, like bats eat fruit, the remaining fruit [contaminated with Ebola virus] there falls on the ground, so some animals do eat that fruit and become infected. So for the cutting grass [cane rat] now they cannot eat this fruit so it eats directly the grass. Like this cutting grass [eats]: maize, rice, sorghum. [...]. No, not only the bats, there are other animals [that you cannot eat], like we talk of porcupine, because it feeds on fruit.

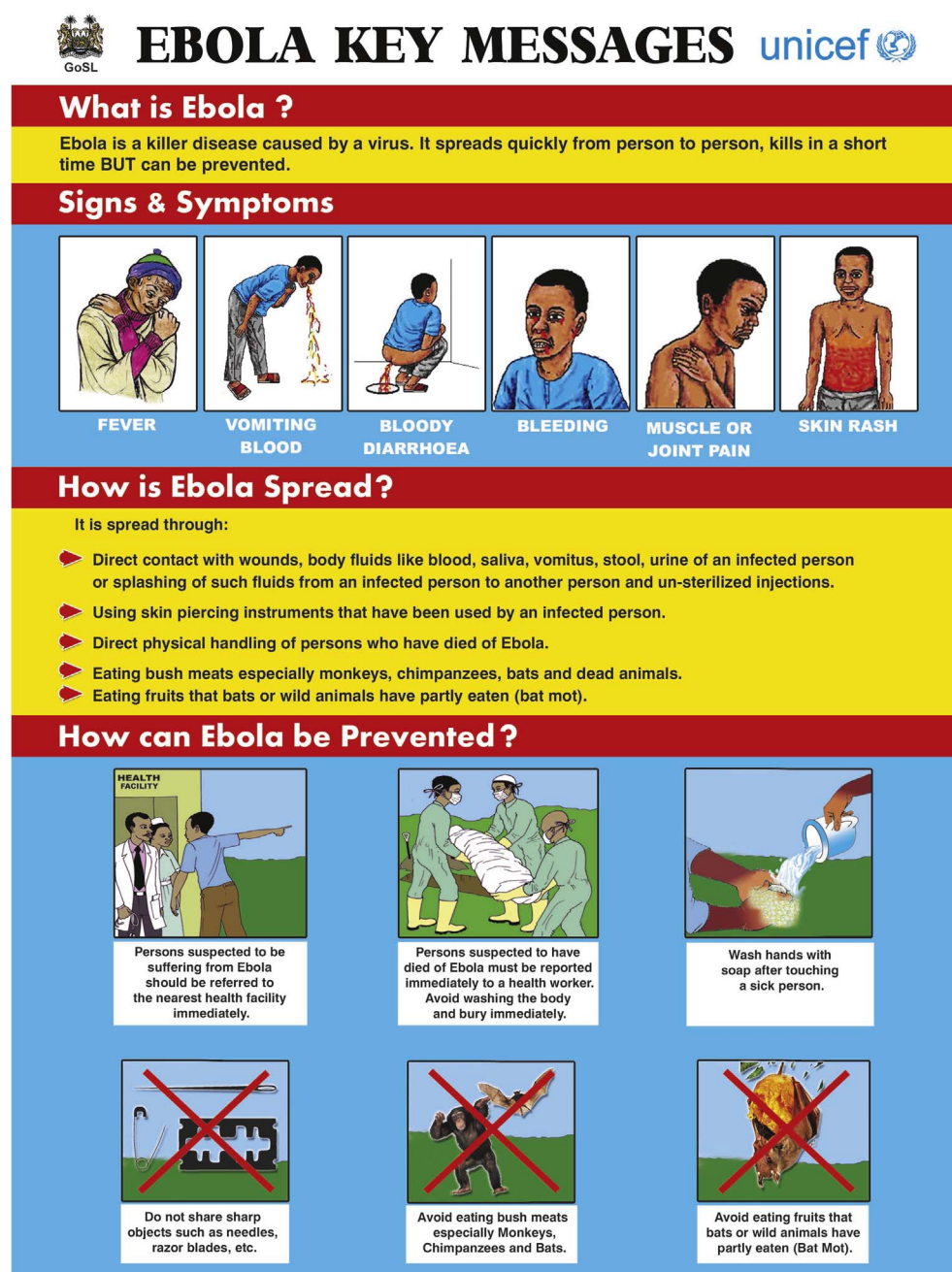


Fig. 1. Ebola virus disease poster distributed in Sierra Leone produced by the Government of Sierra Leone and UNICEF. The bottom row lists avoiding 'bush meats' and 'bat mot' to prevent Ebola virus disease.

Then like ground pig [Gambian pouched rat], also feed on fruit (IDI-01A).

Those that believed or partially believed in the link between EVD and wild meat adopted various strategies to mitigate the perceived risk of infection. Most admitted to only refraining from eating those animals that they understood as posing a risk for EVD. Others explained that cooking methods (boiling and frying meat) and certain ingredients (spices and palm oil) would inactivate the virus.

From the outset, public health messages were clearly at odds with target publics' previous experiences and concurrent empirical observations. Contradicting local evidence of existing diseases and generations of practices surrounding handling and consumption of wild animals, the measures taken to ban them were ignored by many. Similar blanket policies imposed during the outbreak, such as enforced hospital care and safe burials irrespective of the cause of death,

suggested an underlying political motivation. Disregarding valid concerns resulting from empirical evidence, the ban constituted a further example of how local knowledge was discounted as ignorant and an impediment to response efforts (Bolten and Shepler, 2017; Faye, 2015; Wilkinson, 2017).

The bushmeat ban provides a further example of the construction, interpretation, and critical testing of state sanctioned knowledge, a reflex formed by decades of engagement with state and NGO actors during the civil war (Goguen and Bolten, 2017). However, rather than outright rejection of these messages, people elaborated situated hypotheses to make sense of the conflicting and incomplete information they had received. This process of contextualisation helped to bridge the disjuncture between the terrifying and unfamiliar nature of EVD, and the highly routine nature of eating meat. In a survey conducted in 2014 in five Liberian counties, 81% of respondents stated that they

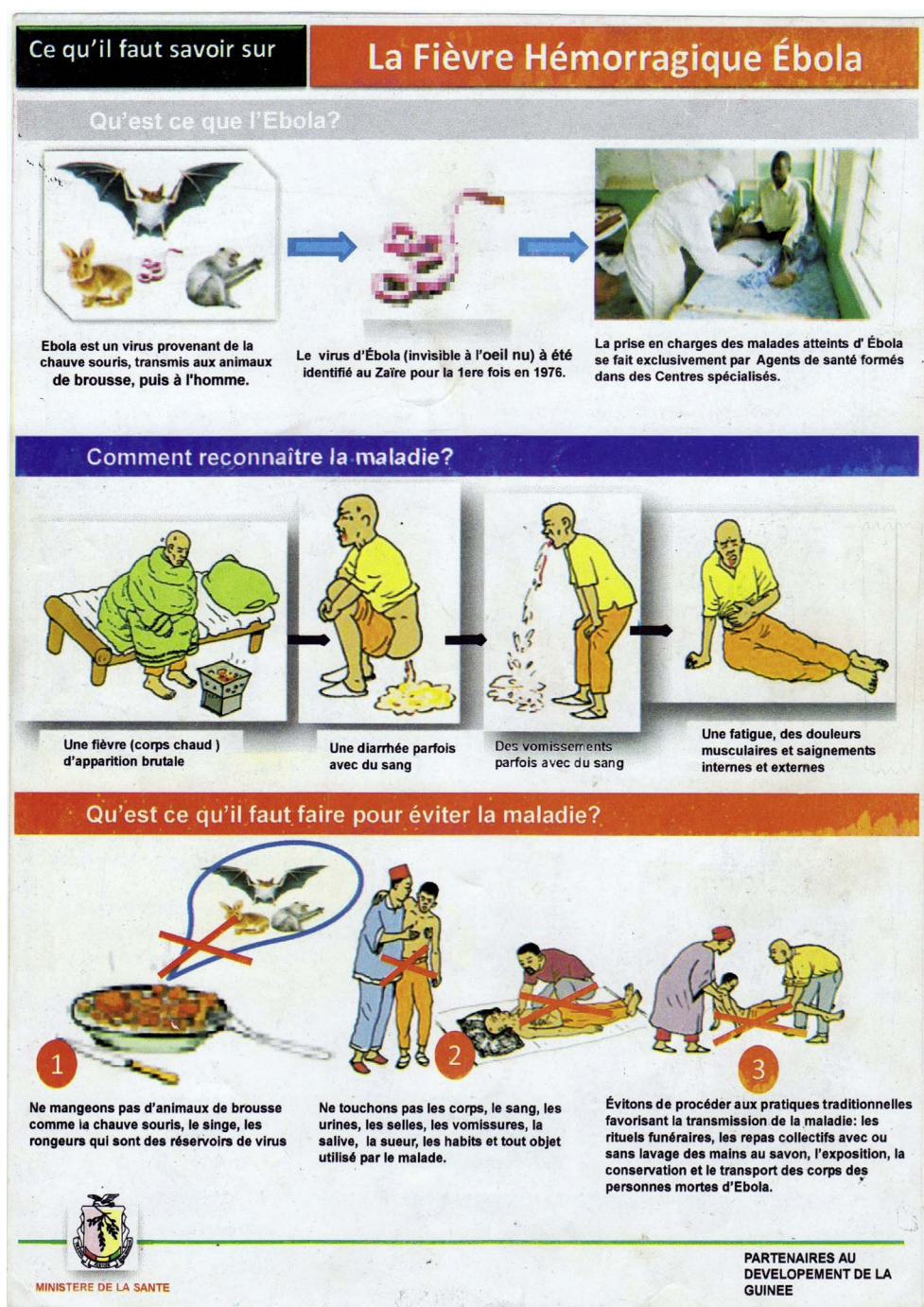


Fig. 2. Ebola virus disease flyer distributed in Guinea later during the course of the outbreak, explaining that 'Ebola is a virus originating from bats, transmitted to bush animals, and then to humans.' A hare and monkey are used to illustrate 'bush animals.' Some informants confused the illustration of the virus for a snake.

could 'get Ebola from bushmeat' (Kobayashi et al., 2015). Similarly, in Sierra Leone, approximately 80% of respondents listed 'bats, monkeys, or wild animals' as the cause or origin of EVD (Jalloh et al., 2017). In one study in Northern Sierra Leone, 45% of respondents stated 'bushmeat' as the cause of EVD; however, the researcher extended this observation by differentiating between what respondents were told was the cause of EVD, and what they thought to be the cause. In the latter case, only 11% of respondents stated 'bushmeat' as a cause, indicating that people rejected the 'bushmeat' narrative in favour of risk factors deducted from local experiences, such as body contact (Richards, 2016 pp80-81). Thus, the attempt of public health messages to communicate the risks posed by wild animals and subsequently change behaviours failed to understand the centrality of meat in everyday life and how people modulated their behaviours by weighing and testing risk.

3.2. Bans and authority

Beyond its logical inconsistencies, the ban's failure to generate the desired degree of public health concern can also be explained by the unclear origins of its legislative authority. In his account of the ban, an animal healthcare worker underscored the complex political ecologies that belied the EVD response:

But the law there passed was, passed by these MSF [Médecins Sans Frontières] people, they were sensitising, other government partner came in and advised not to eat these bush animals. But immediate [ly] after them going back, people will eat, you see, because they have no other source of getting it [meat] (IDI-01A).

This frustration was also manifested towards the government

accused of implementing bans without providing affordable alternatives. In Guinea and Togo, people proudly flouted the ban as a form of defiance towards authorities and an assertion of ethnic identity (Epelboin, 2014; Seytre, 2016). In one particularly memorable case, a prominent Guinean politician in the opposition publicly accused the government of using ‘bushmeat’ as an excuse to blame the ethnic groups of Guinée Forestière for causing the epidemic (CONAKRYINFOS.com, 2014), a recurrent grievance that we would hear on our visits in this politically marginalised region. Echoing that political discontent, a Sierra Leonean farmer said:

Seriously, I am missing out; sometimes I do feel like swearing those who come with these laws, because they do deprive us. Those things that we should be enjoying, they are depriving us from it while they are eating their goat meat, cow meat, we are not used to it. Me in general I have told you I am not used to goat, I am not used to cow. It is bushmeat that I am used to (IDI-09B).

Coercive public health interventions have often served as a breeding ground for rumours and violence (Hewlett and Hewlett, 2008), responses which have been exacerbated by regional political and economic inequalities (Wilkinson and Leach, 2014). Moreover, in failing to account for the potential multiple interpretations to which a public health message can give rise, the credibility of unilateral and homogeneously delivered messages can ultimately lead to a ‘subversion of the scientific discourse’ (Epelboin et al., 2012 p15)—an erosion of credibility that can undercut public health activities.

3.3. Effect of hunting ban on livelihoods

The reception and interpretation of public health messages and enforcement of hunting bans impacted hunting activities in different ways. Informants reported that the frequency of hunting in Bo district fell during the height of the outbreak but increased as the outbreak subsided. Explaining how fear of sanctions proved a greater deterrent than fear of EVD, some informants described how the ban had caused a change in hunting and consumption patterns, with farmers ‘not making much effort’ to hunt animals. In general, however, even the threat of fines and imprisonment were not always strong enough to repress the desire and need for wild meat: ‘There is a law [against eating wild animals],’ one female farmer put it ‘but even I, if I see it [a wild animal], I eat it’ (IDI-21A).

Illegal and informal networks of meat obtained from protected species or outside of the hunting season existed before the EVD outbreak but were laxly enforced. Police controls at road checkpoints led to a change in trading patterns of wild meat. Species in high demand (small nonhuman primates, cane rats, and antelopes), normally sold in urban centres for high prices, were consumed by hunters and their immediate family, or sold within villages at a lower price. The switch from inter- to intra-village trade affected the price of wild meat. In the three villages close to Bo Town, the price of wild meat decreased because of a fall in demand, but also because of the legal risks associated with it. As one buyer addressed a seller: ‘you know it is illegal, so give me the courage to buy it.’ In these three villages, the price of antelope meat, normally sold in towns for a high price, fell by more than half, and the price of cane rats by a third. One key informant made the most of this situation by increasing his wild meat consumption, in particular of those species usually beyond his means. In the more remote villages, the price was reported to have either increased or remained stable. Measures of changes in wild meat consumption during the outbreak have produced mixed results. Consumption continued in Togo (Seytre, 2016) and Sierra Leone (Mufunda et al., 2016). A decline in wild meat consumption from 40% to 16% was observed in the Northern Province of Sierra Leone, but as many as 36% of survey respondents declined to answer the question related to wild meat consumption (Richards and Mokuwa, 2016). While there are obvious challenges to uncovering the volume of trade in illegal markets, our results indicate that sale and

consumption of wild meat still occurred during the outbreak.

Sale was done undercover and only among trusted and established networks of friends and extended family. ‘Now the condition is very difficult,’ one farmer and housewife explained;

People are scared to come with their animal to town even if they catch one. Either with their trap or [through] hunting. So what they normally do when they catch any animal; they go eat it in the bush, in their farm. If they like somebody, you trust, you know you trust somebody, if that person is interested to buy, you can give [sell] (IDI-16A).

Some hunters and traders were willing to take the risk of smuggling wild meat to Bo Town, turning the trade into an underground network compared by one informant to that of the illegal marijuana trade. Hunters and traders developed strategies to avoid road checkpoints, such as using unmonitored ‘bush paths’ or smuggling meat through checkpoints by butchering animals into smaller parts and concealing the meat within cars. In Bo Town, wild meat could only be bought through trusted networks. Keen customers, motivated principally by taste, accessed these new underground networks through use of code-names (‘sweet pepper,’ ‘crab,’ ‘goat soup’). One urban farmer explained:

It is sweet, to God monkey is sweet, it is just the disease, but when they said not to eat monkey I felt bad. As for me when I come to Bo, I do go to [a market] and buy for 2000 Leones [≈ US\$0.50] and eat it (IDI-05B).

The risk of being arrested for possession of wild meat, and the difficulty in buying it, led many people to resort to fish. ‘Ice fish’ (frozen sea fish delivered from large towns), is the most affordable and consistently available source of protein in rural areas. During the outbreak, ‘ice fish,’ smoked fish, and freshwater fish were purchased more frequently (between 15 and 20 times a month), even though access was complicated by movement restrictions as part of the outbreak control measures. The increased demand and absence of other protein alternatives provided ‘ice fish’ traders with an increased negotiating advantage:

So whatever price they [fish traders] want to sell [fish], is the price that you have to buy. So you are wholly and solely going to dance to their tune after what they want to sell. You don’t have any option; you still have to buy fish. So you buy what you see for the day (farmer, IDI-13A).

Surveys of hunters and actors engaged in the wild meat trade show that wild meat is used as a source of meat and income, and, prior to the outbreak, hunting was habitually practiced on a weekly basis in Guinea (Brugiere and Magassouba, 2009; Dufour, 2013), Liberia (Bene et al., 2013; Hoyt, 2004), and Sierra Leone (Subramanian, 2012). Instances of traders exploiting fear and confusion for financial benefits during the outbreak have been previously reported for other agricultural products (Gavelle, 2015), which were already under strain by movement restrictions and decreased purchasing power (Alpha and Figue, 2016). Most affected by the ban were informants who were financially dependent on the wild meat trade. Hunters, traders, and market retailers had to diversify their activity, for example engaging in wood and charcoal production, and in the case of one female retailer, prostitution. Hunters complained that they could not ask for informal loans because they could no longer offer collateral in form of meat.

By the time Sierra Leone was officially declared free of EVD, the frequency of hunting increased, and consumption and trade were no longer covertly conducted. Even informants that previously believed in the link between EVD and wild meat returned to normal hunting and consumption practices, an observation also noted in Northern Sierra Leone (Mufunda et al., 2016). Indeed, the official narrative of ‘eradicating’ the virus implicitly suggested that wild animals posed only a temporary risk and that people could expect a return to normal practices as the outbreak was declared over.

3.4. Social frictions

In addition to its unprecedented mortality rate, the EVD outbreak had profound social consequences — an ‘epidemic of fear’ (Hofman and Au, 2017) that undercut trust within and between communities (Anoko, 2014; Calain and Poncin, 2015). The ban accentuated those tensions particularly towards fellow villagers outside of the extended family circle. ‘We were hiding from one another,’ one farmer put it; ‘no one trusted each other’ (farmer, IDI-30A).

In two villages, informants suggested that the chiefs were pressured by villagers not to enforce hunting bylaws imposed by the government. Villagers decided that hunting would be done ‘quietly,’ and that no one would know who hunted or consumed wild animals. Hunting methods involving more than one participant (e.g., communal hunting with nets) ceased or continued with precautions. In such cases, hunting groups would include only small groups of trusted people, hiding nets at the outskirts of the village, and flushing prey out of hiding in silence. Rodents were the privileged targets, as smaller animals can be trapped and eaten discreetly in the privacy of the farm. Indeed, such precautions were driven by reports of people strategically redeploying the ban for political gains. We documented three episodes where people reported other villagers to the police for consuming wild meat, in order to exact revenge over previous ills and thereby ‘destroy enemies.’ People also coerced hunters and trappers to share a portion of their kill by threatening to report them. ‘We were afraid of ourselves,’ summarized villagers during an informal discussion, describing the atmosphere of fear already compounded by the epidemic. This form of vengeance was however kept in check by the intense pressure of the community towards the denounciators.

Consequently, people were unwilling to give or share wild meat among friends or extended family, keeping it only for themselves and their immediate kin, thereby straining friendships and family relations. Informants described the particular care they took to dissimulate wild meat and the anxiety that their children would denounce them by inadvertently mentioning it to friends. The redeployment of the wild meat ban for political gain, whether perceived or real, speaks to a colonial and postcolonial history of corruption, resentment, and revenge in Sierra Leone, amplified by a prolonged civil war (1991–2002) (Ferme, 2001), and politico-ethnic cleavage in Guinea (Faye, 2015). The socially corrosive nature of the ban offers a compelling example of the ways in which the EVD response extended and refracted preexisting power dynamics, often to the detriment of efforts to secure the health and wellbeing of affected communities (Shepler, 2017).

4. Conclusion

Beyond achieving little to no impact on outbreak control in the face of human-to-human transmission (FAO, 2015; Gire et al., 2014), the ban on wild meat ran the risk of eroding public confidence in the response efforts and fuelling rumours as to the cause of EVD. At the very least, the ‘bushmeat’ ban negatively impacted livelihoods, placing additional and unnecessary stress on communities.

Given the weakness of zoonotic disease surveillance in Guinea and Sierra Leone, it will be difficult to assess whether the ban has any continuing impact on reducing the risk of zoonotic transmission of ebolaviruses and other pathogens. Criminalising hunting cultivates community silence, drives activity underground, and further risks jeopardising surveillance efforts and acceptable, evidence-based prevention strategies for zoonotic disease transmission. Such measures include reducing contact with high-risk species and instituting surveillance and traceability systems for species posing a lower risk for zoonotic infection (Formenty et al., 2004).

The scepticism of villagers towards the ban underlines the radically different understandings of local compared to international and national public health authorities of the risk wild animals posed—and the difficulty in changing such perception in the face of lived evidence. The

reception of the ban further points to the elusiveness of trust—towards governmental bodies, foreign actors, and within communities—during the outbreak. The 2013–2016 EVD outbreak demonstrated that public support and trust in government institutions is critical to the effectiveness of disease control (Blair et al., 2017), and that engaging this support is a complex and multifaceted exercise—precisely the kind of engagement that a hunting ban forecloses. Taking into account the political specificities of public health interventions, we urge caution in retroactively deploying legal sanctions to promote behavioural change, particularly in the context of a complex health emergency.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.socscimed.2017.12.028>.

References

- Abramowitz, S.A., McLean, K.E., McKune, S.L., Bardosh, K.L., Fallah, M., Monger, J., et al., 2015. Community-centered responses to Ebola in urban Liberia: the view from below. *PLoS Neglected Trop. Dis.* 9, e0003706.
- Alpha, A., Figuié, M., 2016. Impact of the Ebola Virus Disease Outbreak on Market Chains and Trade of Agricultural Products in West Africa. Food and Agriculture Organization of the United Nations. <http://www.fao.org/emergencies/resources/documents/resources-detail/en/c/417072/>.
- Anoko, J., 2014. Communication with Rebellious Communities during an Outbreak of Ebola Virus Disease in Guinea: an Anthropological Approach. [Report]. World Health Organization. <http://www.ebola-anthropology.net/wp-content/uploads/2014/12/Communicationduring-an-outbreak-of-Ebola-Virus-Disease-with-rebellious-communities-in-Guinea.pdf>.
- Baize, S., Pannetier, D., Oestereich, L., Rieger, T., Koivogui, L., Magassouba, N., et al., 2014. Emergence of Zaire Ebola virus disease in Guinea. *N. Engl. J. Med.* 371, 1418–1425.
- Bene, J.-C.K., Gamys, J., Dufour, S., 2013. Marketing channel of hunting products in northern Nimba County, Liberia. *Livest. Res. Rural Dev.* 25.
- Blair, R.A., Morse, B.S., Tsai, L.L., 2017. Public health and public trust: survey evidence from the Ebola Virus Disease epidemic in Liberia. *Soc. Sci. Med.* 172, 89–97.
- Bolten, C., Shepler, S., 2017. Producing Ebola: creating knowledge in and about an epidemic. *Anthropol. Q.* 90, 349–368.
- Brugiere, D., Magassouba, B., 2009. Pattern and sustainability of the bushmeat trade in the Haut Niger National Park, Republic of Guinea. *Afr. J. Ecol.* 47, 630–639.
- Calain, P., Poncin, M., 2015. Reaching out to Ebola victims: coercion, persuasion or an appeal for self-sacrifice? *Soc. Sci. Med.* 147, 126–133.
- Charmaz, K., 2006. *Constructing Grounded Theory*. Sage, London.
- Duffy, R., 2014. Waging a war to save biodiversity: the rise of militarized conservation. *Int. Aff.* 90, 819–834.
- Dufour, S., 2013. Etude de la chasse et de la filière gibier dans le corridor du Chemin de fer. Projet SIMANDOU/Rio Tinto. Rapport final. Rio Tinto - Simfer S.A. http://www.riotinto.com/documents/RT_Simandou_Bushmeat_baseline.EN.pdf.
- Epelboin, A., 2014. Approche anthropologique de l’épidémie de FHV Ebola 2014 en Guinée Conakry. [Rapport de recherche]. World Health Organization. <https://hal-univ-diderot.archives-ouvertes.fr/hal-01090291/document>.
- Epelboin, A., Bahuchet, S., Durand, J.L., 2012. Le bon goût de la viande de primate: des interdits des Pygmées Aka aux injonctions écologiques. In: Cross, M., Bondaz, J., Michaud, M. (Eds.), *L’animal cannibalisé: Festins d’Afrique*. Editions des archives contemporaines, Paris, pp. 41–64.
- FAO, 2015. Addressing Zaire Ebola Virus (EBV) Outbreaks. Rapid Qualitative Exposure and Release Assessment. <http://www.fao.org/3/a-i4364e.pdf>.
- Faye, S.L., 2015. The « exceptionality » of Ebola and popular « reticences » in Guinea-Conakry. Reflections from a symmetrical anthropology approach. *Anthropol. Santé* 11 [Online].
- Ferme, M.C., 2001. *The underneath of Things: Violence, History, and the Everyday in Sierra Leone*. University of California Press Ltd., London, England.
- Formenty, P., Epelboin, A., Allaranger, Y., Libama, F., Boumandouki, P., Koné, L., et al., 2004. Séminaire de formation des formateurs et d’analyse des épidémies de fièvres hémorragiques due au virus Ebola en Afrique centrale de 2001 à 2004. *Santé Publique*. pp. 244–254.

- Gavelle, J., 2015. Ebola en Guinée Forestière. Analyse anthropologique des impacts de la Maladie à Virus Ebola (MVE) en Guinée Forestière : société, réponse internationale et moyens de subsistance. [Rapport Scientifique]. Food and Agriculture Organization of the United Nations.
- Gire, S.K., Goba, A., Andersen, K.G., Sealfon, R.S., Park, D.J., Kanneh, L., et al., 2014. Genomic surveillance elucidates Ebola virus origin and transmission during the 2014 outbreak. *Science* 345, 1369–1372.
- Goguen, A., Bolten, C., 2017. Ebola through a glass, darkly: ways of knowing the state and each other. *Anthropol. Q.* 90, 423–449.
- Hewlett, B.S., Amola, R.P., 2003. Cultural contexts of Ebola in northern Uganda. *Emerg. Infect. Dis.* 9, 1242–1248.
- Hewlett, B.S., Hewlett, B.L., 2008. Ebola, Culture and Politics: the Anthropology of an Emerging Disease, first ed. Thomson Wadsworth, USA.
- Heymann, D.L., Chen, L., Takemi, K., Fidler, D.P., Tappero, J.W., Thomas, M.J., et al., 2015. Global health security: the wider lessons from the west African Ebola virus disease epidemic. *Lancet* 385, 1884–1901.
- Hofman, M., Au, S., 2017. The Politics of Fear: Médecins Sans Frontières and the West African Ebola Epidemic. Oxford University Press, New York, USA.
- Hoyt, R., 2004. Wild Meat Harvest and Trade in Liberia: Managing Biodiversity, Economic and Social Impacts. Overseas Development Institute.
- IIED, 2000. Promoting Partnerships: Managing Wildlife Resources in Central and West Africa. Evaluating Eden Series No.4. International Institute for Environment and Development (IIED), London.
- Inhorn, M.C., 2004. Privacy, privatization, and the politics of patronage: ethnographic challenges to penetrating the secret world of Middle Eastern, hospital-based in vitro fertilization. *Soc. Sci. Med.* 59, 2095–2108.
- Jalloh, M.F., Bunnell, R., Robinson, S., Jalloh, M.B., Barry, A.M., Corker, J., et al., 2017. Assessments of Ebola knowledge, attitudes and practices in Forecariah, Guinea and Kambia, Sierra Leone, July–August 2015. *Philos. Trans. R. Soc. Lond. B Biol. Sci.* 372.
- Kobayashi, M., Beer, K.D., Bjork, A., Chatham-Stephens, K., Cherry, C.C., Arzoaquoi, S., et al., 2015. Community knowledge, attitudes, and practices regarding Ebola virus disease —five counties, Liberia, September–October, 2014. *MMWR Morb. Mortal. Wkly. Rep.* 64 (26), 714–718.
- Marí Sáez, A., Nowak, K., Lapeyre, V., Zimmermann, F., Dux, A., Kuhl, H.S., et al., 2015. Investigating the zoonotic origin of the West African Ebola epidemic. *EMBO Mol. Med.* 7, 17–23.
- Mufunda, J., Ndambakuwa, Y., Munodawafa, D., Kobia, A., 2016. Is a total ban on business and consumption of bushmeat a sustainable end game for Ebola outbreak in West Africa: but why now? *Public Health - Open J.* 1, 4–7.
- Nasi, R., Brown, D., Wilkie, D., Bennett, E., Tutin, C., van Tol, G., et al., 2008. Conservation and Use of Wildlife-based Resources. The Bushmeat Crisis Secretariat of the Convention on Biological Diversity, Montreal, and Center for International Forestry Research (CIFOR), Bogor.
- Nasi, R., Fa, J.E., 2015. The role of bushmeat in food security and nutrition. In: XIV World Forestry Conference, Durban, South Africa.
- OIE, Report of the Meeting of the OIE Working Group on Wildlife (83 SG/13/GT), Taipei, Chinese Taipei, 2014. World Organisation for Animal Health. http://www.oie.int/fileadmin/Home/eng/International_Standard_Setting/docs/pdf/WGWildlife/A_WGW_Nov2014.pdf.
- Olivero, J., Fa, J.E., Real, R., Farfán, M.Á., Márquez, A.L., Vargas, J.M., et al., 2017. Mammalian biogeography and the Ebola virus in Africa. *Mamm. Rev.* 47, 24–37.
- Pooley, S., Fa, J.E., Nasi, R., 2015. No conservation silver lining to Ebola. *Conserv. Biol.* 29, 965–967.
- Richards, P., 2016. Ebola: How a People's Science Helped End an Epidemic. Zed Books, London.
- Richards, P., Mokuwa, A., 2016. Ebola Impacts on Livelihoods. A Study of Koinadugu District. [Report]. Food and Agriculture Organization of the United Nations.
- Schulte-Herbruggen, B., Cowlshaw, G., Homewood, K., Rowcliffe, J.M., 2013. The importance of bushmeat in the livelihoods of West African cash-crop farmers living in a faunally-depleted landscape. *PLoS One* 8, e72807.
- Seytre, B., 2016. The wanderings of the communication on the Ebola virus disease. *Bull. Soc. Pathol. Exot.* 109, 314–323.
- Shepler, S., 2017. “We know who is eating the Ebola money!”: corruption, the state, and the Ebola response. *Anthropol. Q.* 90, 451–473.
- Sinha, M.S., Parmet, W.E., 2016. The perils of panic. *Am. J. Law Med.* 42, 223–255.
- Subramanian, M., 2012. Zoonotic disease risk and the bushmeat trade: assessing awareness among hunters and traders in Sierra Leone. *EcoHealth* 9, 471–482.
- Wald, P., 2008. Contagious: Cultures, Carriers, and the Outbreak Narrative, first ed. Duke University Press, Durham, North Carolina, USA.
- WHO Ebola Response Team, 2016. After Ebola in West Africa — unpredictable risks, preventable epidemics. *N. Engl. J. Med.* 375, 587–596.
- Wilkinson, A., 2017. Emerging disease or emerging Diagnosis? Lassa fever and Ebola in Sierra Leone. *Anthropol. Q.* 90, 375–404.
- Wilkinson, A., Leach, M., 2014. Briefing: Ebola-myths, realities, and structural violence. *Afr. Aff.* 114, 136–148.
- Wolfe, N.D., Daszak, P., Kilpatrick, A.M., Burke, D.S., 2005. Bushmeat hunting, deforestation, and prediction of zoonoses emergence. *Emerg. Infect. Dis.* 11, 1822–1827.
- Yamakoshi, G., Leblan, V., 2013. Conflicts between indigenous and scientific concepts of landscape management for wildlife conservation: human-chimpanzee politics of co-existence at Bossou, Guinea. *Rev. Primatol.* 5.

Web References

- BBC, 2015. The hunters breaking an Ebola ban on bushmeat. <http://www.bbc.com/news/world-africa-31985826> Accessed June 2016.
- CONAKRYINFOS.com, 2014. Jean Marie Doré: “la consommation d’animaux sauvages ne donne pas le virus Ebola”. <http://www.conakryinfos.com/jean-marie-dore-la-consommation-danimaux-sauvages-ne-donne-pas-le-virus-ebola/> Accessed June 2016.
- Guineematin.com, 2014. La vente de la viande brousse en Guinée, malgré Ebola: saisie de 96 sacs par les services de police de Labé. <http://guineematin.com/actualites/la-vente-de-la-viande-brousse-en-guinee-malgre-ebola-saisie-de-96-sacs-par-les-services-de-police-de-labe/> Accessed June 2016.
- Guineematin.com, 2016. Traffic de viande de brousse: arrestation de trois personnes avec 106 Kg à Dalaba. <http://guineematin.com/actualites/trafic-de-viande-de-brousse-arrestation-de-trois-personnes-avec-106-kg-a-dalaba/> Accessed June 2016.
- McGovern, M., 2017. Bushmeat and the politics of disgust. <https://culanth.org/fieldsights/588-bushmeat-and-the-politics-of-disgust> Accessed March 2017.
- Nasi, R., Fa, J.E., 2014. ‘Let them eat cake’: a dangerous approach to bushmeat and Ebola. <https://www.cifor.org/blog/let-them-eat-cake-a-dangerous-approach-to-bushmeat-and-ebola/> Accessed June 2016.
- WHO, 2016a. Ebola outbreak 2014–2015. <http://www.who.int/csr/disease/ebola/en/> Accessed October 2017.
- WHO, 2016b. Ebola virus disease fact sheet. <http://www.who.int/mediacentre/factsheets/fs103/en/> Accessed March 2017.